Portland Reservoir No. 2
6007 S.E. Division Street
Portland
Multnomah County
Oregon

HAER No. OR-48

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Western Region
Department of Interior
San Francisco, California 94102

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HISTORIC AMERICAN ENGINEERING RECORD

Portland Reservoir No. 2

HAER No. OR-48

Location:	6007 S.E. Division Street Portland, Multnomah County, Oregon
Date of Construction:	1893-94
Engineer:	Isaac W. Smith, with James Dix Schuyler as consulting engineer
Present Owner:	Beaulieu-Draper, Ltd. P.O. Box 1736 Lake Oswego, Oregon 97035
Present Use:	Abandoned
Significance:	Portland's reservoirs are significant, not only as functioning components of the municipal water system, but also as symbols of the importance of that system to the development of the city from a small town to a large metropolis. The reinforced concrete construction of the reservoirs is notable. Of particular importance, in this respect, are the four 1894 reservoirs, constructed using systems patented by Ernest L. Ransome, nationally recognized pioneer in the field of reinforced concrete. With their picturesque structures and decorative wrought-iron fences and lamp posts, the reservoirs are vital landscape elements for the two major city parks in which they are located.
Report prepared by:	John M. Tess President Heritage Investment Corporation 123 N.W. Second Avenue, Suite 200 Portland, Oregon 97209
	June 1990

Description, Setting, and Alterations

Reservoir No. 2 was designed by Isaac W. Smith, with James Dix Schuyler acting as consulting engineer. The reservoir was completed in 1894 and is one of four reservoirs constructed using systems patented by Ernest L. Ransome. The entire Reservoir No. 2 site is rectangular in shape, approximately 250 feet wide and 700 feet long. It is located on the northeastern corner of S.E. 60th Avenue and Division Street in Mt. Tabor Park in East Portland. Specifically, the reservoir is located on a finger of the park, with residential and commercial development to the north, west and south. The original site for Reservoir No. 2 was 300 feet along 60th Avenue and 1295.1 feet along Division Street (see Site Map).

Originally, the capacity of the reservoir was 20,500,000 gallons and its water elevation 229.2 feet above the low water mark of the Willamette River. Its basin lining of brick and asphalt has been overlaid with other materials over the years. The gatehouse is constructed of poured-in-place, reinforced concrete and contains the mechanisms for opening and closing the water gates. A flight of concrete steps lead diagonally up from the corner of 60th and Division to the gatehouse. The gatehouse, nearly identical to the one at Reservoir No. 1, was built in the form of an oval tower. Below, the roof slab is a corbelled band and the rest of the wall is cast in the form of stone-like blocks. The wall was bush-hammered and tooled to appear as natural stone. Windows are round arched, with four-over-four, double hung sash. The doors are apparently replacements, but the original fanlight remains.

The original brick parapet wall encircles the basin. Originally, this wall was topped by a fence composed of pointed, round bar. This fences has been replaced by a chain-link fence, attached to the remaining posts. The original gates, hung from brick piers at the top of the ramp at the north end of the basin, are still in place.

The relationship between the two reservoirs on the Mt. Tabor site was one of water storage and transport. Reservoir No. 1 is located at an elevation of 411.6 feet and it received water through a pipeline that ran 24 miles from the Bull Run River headworks. Reservoir No. 2 is located at an elevation of 229.2 feet and it received the water flow from Reservoir No. 1. In the center of Reservoir No. 2, a five-inch nozzle originally shot a stream of water some 500 feet in the air. Force for this fountain came from the fall of water from Reservoir No. 1. Its role was practical as well as ornamental -- to keep the water in motion and, therefore, purer. The fountain structure is still in place.

Sites for Reservoirs No. 1 and 2 were purchased by the Water Committee specifically for the reservoirs and were limited to less than ten acres each in size. The additional area now comprising Mt. Tabor Park was acquired by the city in connection with construction of Reservoirs No. 5 and 6. Mt. Tabor Park is now 176.23 acres in extent. Reservoir No. 2 is located on a finger of the park (see 1906 map).

Unlike the other three 1894 reservoirs, Reservoir No. 2 was excavated, rather than built in a natural ravine. The original basin lining, consisting of a double layer brick heavily coated with asphalt, was never satisfactory. Leaks developed the first year and, despite frequent repairs and attempts at waterproofing, continued to be a problem. Because of the persistent leaks which developed over the years, the reservoir was taken out of service and served as a storage yard for the Water Bureau.

Significance of City Reservoirs

[This section has been taken directly from the statement of significance for the Portland reservoirs no. 1, 2, 3, 4, 4, and 6 Thematic National Nomination Statement prepared by Virginia Guest Ferriday, architect, AIA, in September 1985.]

Portland's reservoirs are significance, not only as functioning components of the municipal water system, but also as symbols of the importance of that system to the development of the city from a small town to a large metropolis. The reinforced concrete construction of the reservoir is notable. Of particular importance in this respect are the four 1894 reservoirs, constructed using systems patented by Ernest L. Ransome, nationally recognized pioneer in the field of reinforced concrete. With their picturesque structures and decorative wrought-iron fences and lamp posts, the reservoirs are vital landscape elements for the two major city parks in which they are located.

All six reservoirs included in this thematic nomination were constructed as part of the city of Portland's Bull Run water supply system. Reservoirs no. 1 and 2 in Mt. Tabor and nos. 3 and 4 in Washington Park were completed in 1894, the same year as the original Bull Run headworks and pipeline. Reservoirs no. 5 and 6 in Mt. Tabor were built in 1911 to provide the additional storage capacity required by construction of a second pipeline from Bull Run.

Portland's Bull Run supply system was named for its source of water, the Bull Run River, which flows southwest through the Cascade Mountains, from its head at Bull Run Lake, about ten miles from Mt. Hood, to its confluence with the Sandy River east of Portland. The original headworks for the water system was located on the Bull Run River approximately 22 miles downstream from Bull Run Lake at an elevation of 716 feet above the low water mark of the Willamette River. From there, the pipeline was run 24 miles to Reservoir No. 1 on Mt. Tabor in East Portland. From Reservoir No. 1, water flowed to Reservoir No. 2 on Mt. Tabor and to Reservoirs no. 3 and 4 in Washington Park on the west side of the Willamette River, six miles from Mt. Tabor.

Because of the greater elevation of the Bull Run headworks, water for all but the highest areas of the city could be supplied by gravity. On each side of the Willamette River, two service districts were established: a high service district and a low service district. Reservoirs no. 1 and 3, located at elevations 411.6 and 299.5, respectively, supplied the high service district, and Reservoirs no. 2 and 4, located at elevations 229.2 and 229.5, respectively, supplied the low service districts. Water for higher areas was pumped from the reservoirs to tanks on the hilltops above these areas. After 1911, there were three service districts on the east side, with Reservoirs no. 1 and 5 serving the high service district, Reservoir No. 6 serving the intermediate district, and Reservoir No. 2 serving the low district. Although there have been other additions and alterations over the years, the system operates today essentially as it did originally.

Prior to completion of the Bull Run supply system, water for Portland residents was obtained primarily from the Willamette River. Early settlers had often commented on the purity of Willamette River water. Its quality had, however, deteriorated over the years of continuing settlements of the Willamette Valley. P. F. Morey, an early agitator for construction of the Bull Run system, summed up the situation in 1884

as follows: "....the river Willamette is the sewer of nearly one-third of the state...Men should not drink such water, nor use it in their house either for culinary or lavatory purposes. They have been doing so in defiance of every sanitary principle; and as the state grows older and becomes more settled up, the [contamination] will only increase, and the danger of a greater epidemic overwhelm this entire community."

At the time Morey wrote this piece, water was supplied by privately-owned water companies. Undertaking a project of the Bull Run system would require some form of public financing and public ownership. In 1885, the state legislature established the Portland Water Committee and empowered it to issue bonds not to exceed $3,200,000. Appointed to the committee were Henry Failing (Chairman), L. Fleischner, J. Loewenberg, L. Therkelsen, F. C. Lewis, F. Dekum, W. K. Smith, R. B. Knapp and A. H. Johnson. The committee purchased the privately-owned Portland Water Company and began e extending its distribution system. Early in 1886, the committee began making plans to construct a pipeline from Bull Run. However, they were soon stymied in their efforts by opposition from Governor Sylvester Pennoyer. Pennoyer, said by one of his contemporaries to have an "impracticable, cranky nature," vetoed the bill authorizing the additional bonds needed to carry out the project. Opposition to tax-free bonds was one of Pennoyer's prime campaign issues. He also voiced doubts as to the desirability of Bull Run water, claiming that it came from melting glaciers and would cause goiter in the fair sex of Portland. (During these difficult times, an engineer for the Water Committee tramped to the source at Bull Run Lake, where he camped out for several days taking pictures to prove that the water was not fed by glaciers.) Finally, in 1891, the bond issue was submitted without the tax exempt clause. It passed and was signed by Pennoyer.

Isaac W. Smith had been appointed chief engineer by the Water Committee on December 22, 1885. In 1886, Smith was directed by the committee to make a survey of the line from Bull Run and, that same year, he presented to the Water Committee the "Specifications of Works for the Water Supply of the City of Portland," in which he outlined the requirements for headworks, pipelines and reservoirs. On September 6, 1891, Smith presented another report to the committee, in which he stated that "A high and low service reservoir are needed for the economical operation of the works, and to compensate for the varying consumption of water at different portions of the day." Smith remained in the position of chief engineer until 1897. During that period he was responsible for the design and construction of the headworks at Bull Run, the pipeline to Portland, and the reservoir system.

Smith was born in Fredericksburg, Virginia. A graduate of Virginia Military Institute, he devoted his entire career to civil engineering. He was a captain in the Engineer Corps of the Confederate Army, afterwards engaging in public land surveys of Washington State. He built lighthouses at Sholawater Bay and at New Dungeness Smith's Island and Tatoosh on the Straits of Fuca. He platted the gas and water works for the Tacoma Light and Water Company. As engineer for the Northern Pacific, he located the lines from Portland to Kalama and from Kalama to Tacoma, as well as the line across the Cascade Mountains from Tacoma to the Yakima and Columbia rivers. He also built the system of steamboat locks around Willamette Falls.

James Dix Schuyler of Los Angeles was hired as consulting engineer by the Water Committee and given specific responsibility for the reservoirs, including their dams, pipe connections and pumping station. Schuyler was born and educated in New York, but practiced his profession in the western states and territories. After working on railroad construction, he began specializing in hydraulics. For several years, Schuyler was in charge of irrigation investigation for the state of California. In that position, he designed and constructed the Sweetwater Dam near San Diego, California. He was also engineer for the Hemst Dam in Riverside County, California. The Water Committee evidently learned of Schuyler through his brother, Phillip, who was its first secretary.

A third engineer, *Charles E. Oliver,* was responsible for surveys for the pipeline from Bull Run, for acquiring sites for the headworks and reservoirs, and for acquiring rights of way for the pipeline. Oliver was born in Iowa in 1856 and came to Oregon in 1864. He was educated in Portland primary and secondary schools, but apparently acquired his engineering skills on the job rather than in the classroom. Prior to his employment by Smith, Oliver had worked in the city engineer's office as chairman and roadman. He worked on the Bull Run pipeline and reservoirs from 1886 to early 1887, from 1889 to 1890, and from 1893 until 1895. After 1895, he continued to work for the Water Department, primarily at the Bull Run headworks.

Excavation for Reservoirs no. 1, 2, 3, and 4 began in 1893 and was completed in 1894. Concrete work on the dams, basin linings, and gatehouses was in progress while grading was still underway. The goal was to complete the reservoirs by January 1895, when the first Bull Run water was to flow to Portland.

C. E. Oliver wrote of work on the reservoirs as follows: "1 was superintendent of construction on Reservoirs Nos. 1, 2, 3 and 4 during the great depression of 1893 and 1894. They did not call it a depression then, but used the more expressive term, 'hard times.' The Water Committee built all of the reservoirs by day labor, except the excavation which was let by contract. Lawyers, doctors, dentists, accountants, and all classes of men were employed on the work as day laborers at $1.50 per day for common labor, and they were glad to get it. Men with families were employed almost exclusively. At times, we had as many as 1,500 men on the payrolls for the four reservoirs."

The method of reinforced concrete constructed adopted for the dams, gatehouses, and retaining walls is unusual and was quite innovative at the time. Although reinforced concrete was nothing new at the time, reinforcing methods were in the early experimental stages, both in the United States and in Europe. The method of concrete construction for the reservoirs had a patent, known as the "concrete and twisted iron patent." The concrete finish was also patented, as were the circular lights cast in the concrete of the gatehouse floors and pumphouse roof, and even the concrete mixer itself. All of these patents were held by Ernest Leslie Ransome, considered by historians as the leader in early reinforced concrete technology in the United States.

Ernest Leslie Ransome (1844-1917) was born in Epswich, England. His family had engaged in the manufacture of agricultural machinery since the late eighteenth century, and some of Ransome's ancestors had been inventors as well. Between 1844 and 1867, his father developed and manufactured a patented concrete stone. Following an apprenticeship in the family business, Ernest Ransome came to the United

States to exploit his father's patent. He settled in San Francisco, where he established a business to manufacture concrete blocks. His first notable innovation came in 1884 when he used twisted square bars as reinforcement. The round bars previously used had not established a good connection with the surrounding concrete. These twisted bars, which came to be known as "Ransome Bars," were used as reinforcement for Portland's reservoirs. Ransome achieved the full concrete frame around 1900, and began experimenting further in unit construction. By about 1910, however, many others were entering the field of reinforced concrete construction and Ransome lost his position as frontrunner.

The concrete work for the reservoirs is notable, not only because it was technically innovative, but also because of its aesthetic qualities. Form work was constructed to give the general outlines of stone blocks, with beveled edges and recessed, beaded "mortar joints." After the form work was removed, the concrete was tooled and bush hammered in a variety of textures as if it were natural stone. The level of detail given to its finishes would be unusual, even for a non-utilitarian structure.

Contracts for the ornamental iron fences and lamp posts around the 1894 reservoirs were awarded on September 20, 1894, to Johann H. Tuerck. Tuerck, born in Germany in 1863, was trained in Bayreuth, Munich and Nuremberg before he came to America in 1888. Eighteen months after arriving in Portland in 1890, he established Portland Art Metal Works. He is credited with the wrought-iron work for major banks, clubhouses, churches and residences built in Portland during the 1890s, the 1900s, and the 1910s. The ornamental iron fences and lamp posts on Reservoirs no. 1, 2, 3, and 4 are prime examples of his work.

The massive construction project of the headworks, pipeline and reservoirs was not entirely finished before the Water Committee was faced with a severe problem. As Reservoir No. 3 was being filled on December 14, 1894, cracks were observed in the bottom. It was emptied on December 20th. Reservoir No. 4 remained partially filled from December 1894 to the following September, when cracking forced engineers to empty it also. Repairs were made and the basins were partially filled. During 1896, as the cracks increased in number and size, the basins were only partially filled or kept empty. It soon became obvious that the hillside above the two reservoirs was sliding.

At the time that the reservoirs were constructed, the tract of land to the west of Reservoirs no. 3 and 4 was owned by the King Real Estate Corporation, which had platted it for a development of single-family residences and named it Melinda Heights. In 1892, to promote lot sales, a cable car line had been run up the hill from Jefferson Street, across the future site of Reservoir No. 4, to what is now Kingston Avenue. Faced with relocation, due to construction of the reservoir, the owners of the cable car line had opted to abandon it. Most segments of the line, however, remained in place.

In 1897, the King Real Estate Investment Corporation filed suit against the city, claiming that construction of the reservoir had undermined Melinda Heights and that 71 of the building lots were sliding downhill. The suit came to trial in 1899. By presenting detailed documentation of the geology of the hillside, of rainfall patterns and of movements of the cable car tracks prior to excavation for the reservoirs, the city was able to persuade the jury that the movement resulted from natural causes, that the slide was an ancient one, that the hillside had been moving two years prior to the excavation, and that the movement was caused by express water in the soil. The city did, however, subsequently purchase Melinda Heights from the King Real Estate Investment Corporation, eventually adding it to the adjacent city park.

Even with the favorable outcome of the trial, the Water Committee still had to contend with damages caused by what was for many years referred to in Water Department records simply as "the Sliding Land." The slide was quite extensive: 29.57 acres in area, 3,400,000 cubic yards in volume, and weighing approximately 4,600,000 tons. To solve the drainage problem, believed by the engineers to be the cause of the slide, the Water Department constructed a system of drainage tunnels. Elevators lowered workmen 115 feet below grade, where they excavated and shored up the six-foot-high tunnels. The tunnel system was finally completed in 1905. The tunnels are still in place, though apparently filled with gravel.

With the hillside stabilized, the reservoirs could also be repaired and put back into service. By 1904, Reservoir No. 4 had evidently been completely empty for some time, as the Oregonian reported that there were "..shrubs growing luxuriantly in the bottom ..subsisting on soil which was washed through the broken walls. Squirrels live in the bushes..." Repairs were completed and the reservoirs were back in service in 1905. The work was done under the supervision of engineer David Dexter Clarke, who was responsible for the design of the 1911 reservoirs no. 5 and 6.

Fortunately the Portland's west side, the water system had been designed so that Bull Run water flowing to reservoirs could bypass the reservoir basins and be routed through the gatehouses directly to consumers. It was, therefore, possible to maintain uninterrupted service during the years 1895 to 1905, when reservoirs no. 3 and 4 were in and out of service.

By 1906, plans were underway to construct a second pipeline from the Bull Run headworks. A second pipeline would also necessitate additional reservoir storage. After some public debate, it was decided that two new reservoirs would be built on Mt. Tabor. At the same time the land was being acquired for the reservoirs, additional land was being purchased for the creation of a public park. Early in 1909, sites for the reservoirs were secured and, in October of that same year, contracts were awarded to Robert Wakefield & Company for construction of reservoirs no. 5 and 6.

David Dexter Clarke, who succeeded Isaac Smith as chief engineer of the Water Committee upon Smith's death in 1897, was responsible for the design of reservoirs no. 5 and 6. Clarke was born in New England and moved to Portland in 1864. During the following twenty-six years, he worked in Portland, Olympia and Tacoma, primarily as a surveyor. While employed by the Northern Pacific Railroad Company as assistant engineer, he was in charge of terminal improvements at Tacoma. In 1884 and 1885, he was principal assistant to Isaac W. Smith during construction of the Tacoma Water Works. He began work for the Portland Water Committee in 1893. He remained in the position of chief engineer from 1897 until his resignation in 1917.

Reservoir No. 5 was constructed with the same water elevation as Reservoir No. 1 and connected to it by a tunnel. This enabled the two to function as one. Reservoir No. 6, with a water elevation of 305 feet, served as intermediate district, between the east side high and low service districts. Both reservoirs were completed in 1911. Since that time, no new reservoirs have been constructed in Portland.

Gatehouses for reservoirs no. 5 and 6 were, like the earlier reservoir structures, built of reinforced concrete. In the intervening seventeen years, reinforced concrete had, however, come of age. So,

although the concrete work on the 1911 reservoirs is excellent in many respects, it was not as innovative as the 1894 work. Plans for the 1911 structures specified that the concrete would be bushhammered, like the 1894 work, but it was, in fact, left smooth. In 1923, a small one-story concrete inlet gatehouse was built adjacent to Reservoir No. 1 and, in 1951, an inlet gatehouse was built adjacent to Reservoir No. 5. These are similar in style and detailing to the 1911 gatehouses. Iron fences on the 1911 reservoirs are similar to those on the 1894 reservoirs, but without the leaf decorations. The 1911 lamp posts are similar but much stockier that those of 1894.

All six reservoirs are important landscape features. That they were intended for pleasure as well as for utility is evident from an Oregonian article of January 1, 1895, which states , "When this work is completed the brilliantly lighted walks surrounding the reservoirs will be the most popular promenades in the city during the evenings of the warmer months of the year," and "These walks afford a delightful promenade for visitors who are separated from the basin itself by a concrete wall surmounted by a neat iron fence. All the reservoirs have been constructed in the most substantial manner an the effect of harmony it was possible to obtain by a little attention to the adornment of the finished work has not been overlooked by the engineers to charge." In spite of certain subsequent lapses in "attention to the adornment of the finished work," the reservoirs continue to attract and delight the many visitors who come to the parks each year.

Description of Work to Occur to the Site

It is proposed that Portland Reservoir No. 2 be converted into elderly housing on the reservoir portion of the site, as depicted in the attached site plan. The site, while not listed in the National Register, has been determined eligible for listing in the National Register of Historic Places. The basin is the site of the planned development, while the gatehouse is now in private ownership and is being rehabilitated as a separate project.

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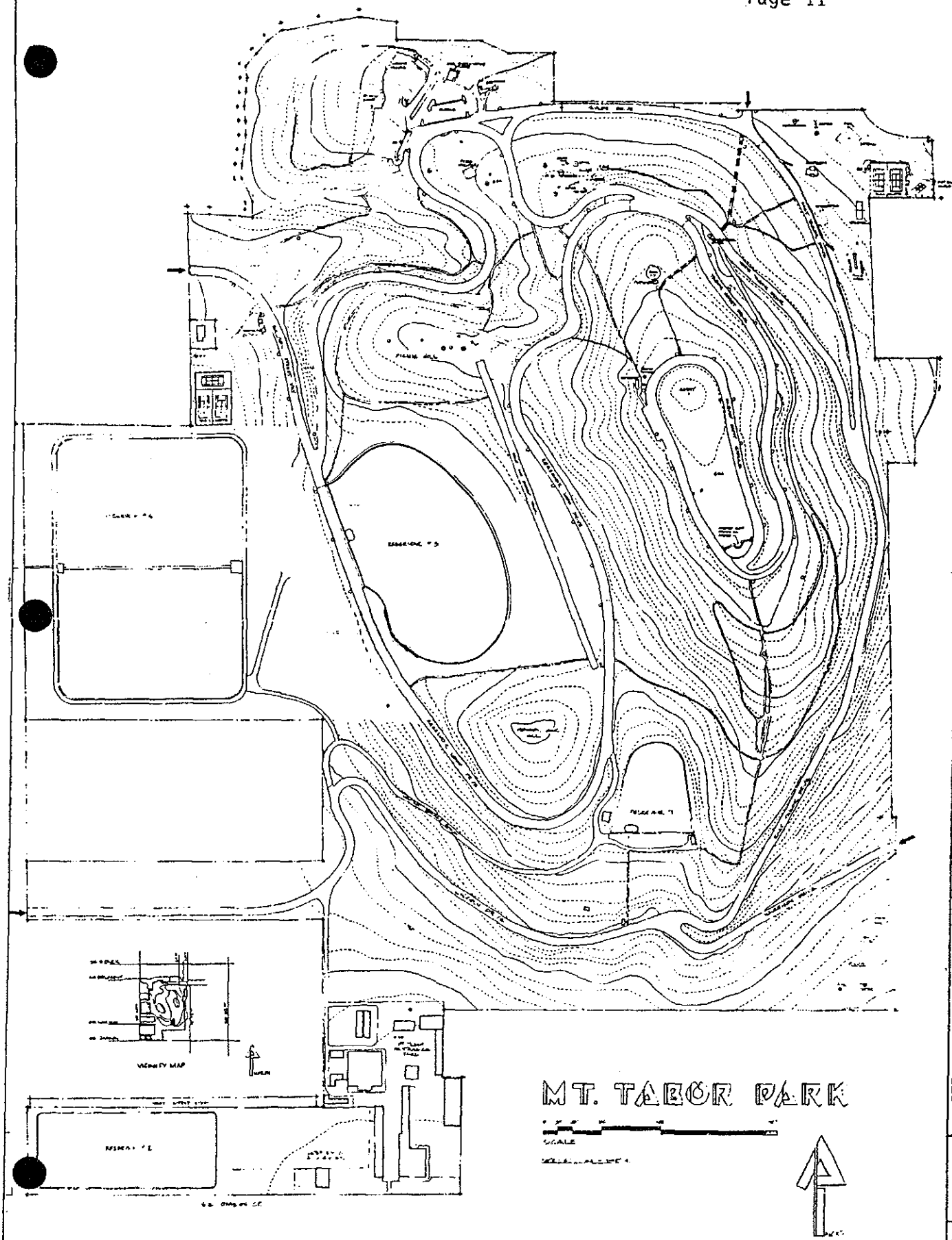
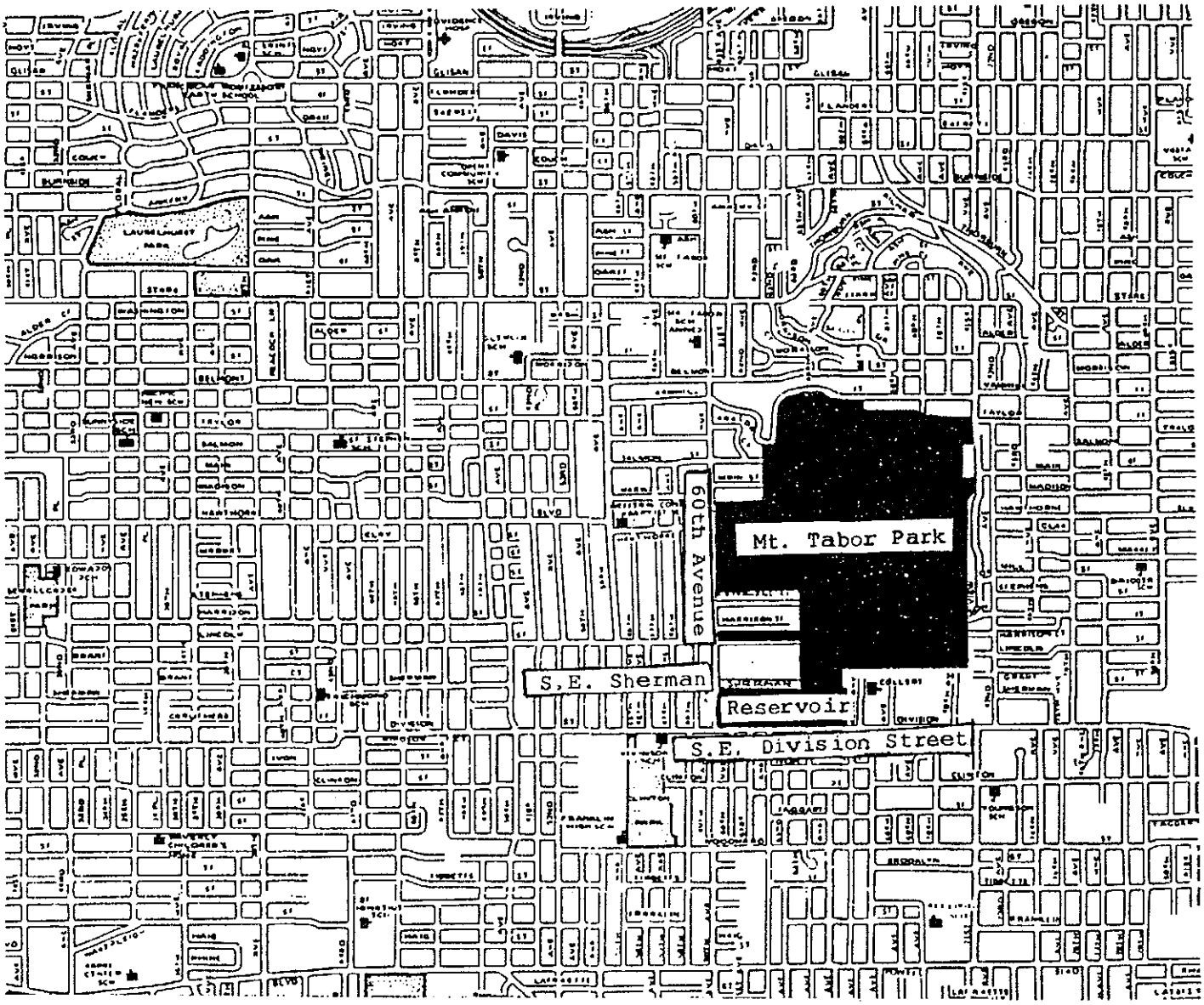

MT. TABOR PARK
SCALE
BUREAU OF PARKS AND RECREATION
CHARLES R. JORDAN COMMISSIONER OF PUBLIC AFFAIRS
PORTLAND OREGON
MT TABOR PARK
SHEET 7A OF 11
SHEET 7B OF 11



Portland Reservoir No. 2 is bounded on the south by S.E. Division Street, a mixed-use commercial/residential area. To the east the Reservoir is bounded by Mt. Tabor Park. To the west it is bounded by S.E. 60th Avenue, a residential area. To the north it is bounded by residential development located along S.E. Sherman.